

In this study, the authors aimed to realize a parametric determination of the convective heat transfer coefficient of a gasoline engine on both the in-cylinder and jacket sides. The combustion products have been determined as a function of excess air coefficient. Cylinder temperature and pressure have been calculated with a simplistic model based on the first law of thermodynamics. The in-cylinder heat transfer coefficient is evaluated by using two different expressions; one a specific form of Annand's equation and the other the Woschni equation. Newton's convective heat transfer equation has been utilized to obtain the heat transfer coefficient between the engine block and the cooling water. This process is based on some temperature measurements at various locations in the cooling space, as the distance between the tip of the temperature sensor and the inner cylinder surface is varied for each location. The values of both coefficients for various engine parameters were determined.

06/02274 Performance analysis of an irreversible Brayton heat engine based on ecological coefficient of performance criterion

Ust, Y. *et al. International Journal of Thermal Sciences*, 2006, 45, (1), 94–101.

A performance optimization based on a new ecological criterion called ecological coefficient of performance (ECOP) has been presented for irreversible Brayton heat engine. The considered model includes irreversibilities due to finite rate heat transfer, heat leakage and internal dissipations. The ECOP objective function is defined as the ratio of power output to the loss rate of availability. The optimal performance and design parameters at maximum ECOP conditions are obtained analytically. The effects of major parameters on the general and optimal ecological performances have been investigated. The obtained results based on ECOP criterion are compared with an alternative ecological objective function defined in the literature and the maximum power output conditions, in terms of entropy generation rate, thermal efficiency and power output.

06/02275 Phase inductance estimation for switched reluctance motor using adaptive neuro-fuzzy inference system

Daldaban, F. *et al. Energy Conversion and Management*, 2006, 47, (5), 485–493.

A new method based on an adaptive neuro-fuzzy inference system (ANFIS) for estimating the phase inductance of switched reluctance motors (SRMs) is presented. The ANFIS has the advantages of expert knowledge of the fuzzy inference system and the learning capability of neural networks. A hybrid learning algorithm, which combines the least square method and the back propagation algorithm, is used to identify the parameters of the ANFIS. The rotor position and the phase current of the 6/4 pole SRM are used to predict the phase inductance. The phase inductance results predicted by the ANFIS are in excellent agreement with the results of the finite element method.

06/02276 Procedure for engine transient cycle emissions testing in real time

Arregle, J. *et al. Experimental Thermal and Fluid Science*, 2006, 30, (5), 485–496.

In this study, a procedure was applied for the performance of real-time emissions measurement at engine transient tests. The measurement of gaseous emissions from raw exhaust was done according to the standard ISO16183:2002 and the particulate mass emission was determined by an alternative method based on the measurement of smoke opacity and hydrocarbon emission during the transient test for further conversion to particulate mass. The method for calculating particle mass was validated by comparison with experimental data obtained by application of the standard gravimetric method. A measurement strategy, including engine preconditioning and control of ambient temperature, was applied to improve measurements. For the analysis of results, the time misalignment of the measurements was corrected by the calculation of the delay times produced as a result of the measurement systems configuration. The measurement procedure was applied to two cases of cycles UDC: with and without glow plug inside the cylinder of a light duty Diesel engine. The time evolution of each pollutant was analysed to get understanding of which stages of the cycle produce more pollution and the comparison between both cycles was done by using the exhaust emissions integrated during the tests.

06/02277 Thermodynamic analysis of a Stirling engine including dead volumes of hot space, cold space and regenerator

Kongtragool, B. and Wongwises, S. *Renewable Energy*, 2006, 31, (3), 345–359.

This paper provides a theoretical investigation on the thermodynamic analysis of a Stirling engine. An isothermal model is developed for an imperfect regeneration Stirling engine with dead volumes of hot space, cold space and regenerator that the regenerator effective temperature is an arithmetic mean of the heater and cooler temperature. Numerical

simulation is performed and the effects of the regenerator effectiveness and dead volumes are studied. Results from this study indicate that the engine net work is affected by only the dead volumes while the heat input and engine efficiency are affected by both the regenerator effectiveness and dead volumes. The engine net work decreases with increasing dead volume. The heat input increases with increasing dead volume and decreasing regenerator effectiveness. The engine efficiency decreases with increasing dead volume and decreasing regenerator effectiveness.

Hybrid engine systems

06/02278 Diesel engine performance and emission characteristics of biodiesel produced by the peroxidation process

Lin, C.-Y. and Lin, H.-A. *Fuel*, 2006, 85, (3), 298–305.

Biodiesel is an alternative fuel that is cleaner than petrodiesel. Biodiesel can be used directly as fuel for a diesel engine without having to modify the engine system. It has the major advantages of having high biodegradability, excellent lubricity and no sulfur content. In this study, the biodiesel produced by a transesterification technique was further reacted by using a peroxidation process. Four types of diesel fuel, biodiesel with and without an additional peroxidation process, a commercial biodiesel and ASTM No. 2D diesel were compared for their fuel properties, engine performance and emission characteristics. The experimental results show that the fuel consumption rate, brake thermal efficiency, equivalence ratio, and exhaust gas temperature increased while the bsfc, emission indices of CO₂, CO and NO_x decreased with an increase of engine speed. The three biodiesels showed a higher fuel consumption rate, bsfc, and brake thermal efficiency, while at the same time exhibited lower emission indices of CO and CO₂ as well as a lower exhaust gas temperature when compared to ASTM No. 2D diesel. Moreover, the biodiesel produced with the additional peroxidation process was found to have an oxygen content, weight proportion of saturated carbon bonds, fuel consumption rate, and bsfc that were higher than the biodiesel produced without the additional process; while at the same time the brake thermal efficiency, equivalence ratio, and emission indices of CO₂, CO and NO_x were found to be lower. In particular, biodiesel produced with the addition of the peroxidation process had the lowest equivalence ratio and emission indices of CO₂, CO and NO_x among all of the four test fuels. Therefore, the peroxidation process can be used to effectively improve the fuel properties and reduce emissions when biodiesel is used.

06/02279 On applicability of reciprocating flow turbines developed for wave power to tidal power conversion

Takenouchi, K. *et al. Renewable Energy*, 2006, 31, (2), 209–223.

Tidal power generation with reciprocating turbines in a simple system is investigated on a performance simulation in order to enlarge the capability of practical use of tidal power with extra-low head and time-varying energy density characteristics. Four reciprocating turbines, which are two types of impulse and a Wells developed for wave power conversion systems, and a cross-flow type of Darrieus for extra-low head hydropower are focused for utilizing extra-low head tidal power. Their turbine characteristics in a unidirectional steady flow obtained by physical test models are compared in non dimensional forms and power plant performance with the turbines are numerically simulated on equivalently scaled turbines based on the low of similitude on turbine performance with the non dimensional characteristics under one of the simplest controls in combination with suitable reservoir ponds area. The output of the power plant depends on tidal difference and a pond inundation area. The results are summarized and discussed on the averaged electric output of the power plant and the optimum scale of pond inundation area.

06/02280 Power output performance characteristics of a horizontal axis marine current turbine

Myers, L. and Bahaj, A. S. *Renewable Energy*, 2006, 31, (2), 197–208.

A 0.4 m diameter horizontal axis marine current turbine was tested in a circulating water channel. The power output was measured over a range of flow speeds, blade pitch and rotor yaw angles. Experimental results were compared with the modelled output determined from a commercial blade element momentum computer package. The measured power output was found to be far in excess of predicted values for high blade inflow angles. This occurred where approximately half the blade was operating above the stall angle of attack. This represents 25% of the rotor disk area producing power under heavy stall. Values of overpower up to 140% were measured which are